

Claims

1. Device for control of a hydraulically actuatable shifting element (2) of a motor vehicle transmission, specially of a powershift transmission, comprising one clutch piston (3) which defines with a first surface (A_1) a hydraulically pressurizable piston space (4) and with a second surface (A_2) of a different size a hydraulically pressurizable reset space (5) and comprising a slide valve system which has a first clutch valve (8) associated with said piston space (4), a second clutch valve (9) associated with said reset space (5) and a holding valve (11) associated with said reset space (5), which valves can be moved according to a control pressure (p_EDS) adjusted by a pressure adjuster (12), a change between a pressurization of said clutch piston (3) on said piston space (4) side and on said reset space (5) side being carried out as control function so that said clutch piston (3) on its surface (A_2) facing said reset space (5) is pressurized in an unshifted state of said shifting element (2) and is discharged in a shifted state of said shifting element (2) and both surfaces (A_1, A_2) of said clutch piston (3), when said shifting element is engaged, are pressurized up to a pre-defined pressure-adjuster control pressure (p_EDS_2) with at least approximately the same pressure.

2. Device according to claim 1, characterized in that the pressure in said reset space (5), after reaching the pre-defined pressure-adjuster control pressure (p_EDS_2) is reduced by said second clutch valve (9) and the pressure in said piston space (4) is further increased by said first clutch valve (8).

3. Device according to claim 1 or 2, characterized in that the ratio of said surfaces (A_1, A_2) on said clutch piston (3) and said pre-defined pressure-adjuster control pressure (p_EDS) are laid out so that pre-defined shifts critical to shifting quality occur at least predominantly during a pressurization with the same pressure of both surfaces (A_1, A_2) of said clutch piston (3).

4. Device according to any one of claims 1 to 3, characterized in that said holding valve (11) associated with said reset space (5) is designed as inverse proportional pressure-reducing valve.

5. Device according to any one of claims 1 to 4, characterized in that to said holding valve (11) associated with said reset space (5) is fed as control pressure the pressure-adjuster control pressure (p_{EDS}) concentrated on said first clutch valve (8) and on said second clutch valve (9).

6. Device according to any one of claim 1 to 4, characterized in that to said holding valve (11) associated with said reset space (5) is fed as control pressure the pressure (p_1) concentrated on said piston space (4).

7. Device according to any one of claims 1 to 4, characterized in that said first clutch valve (8) is designed as proportional pressure-reducing valve and said second clutch valve (9) as inverse-proportional pressure-reducing valve with pressure-adjuster control pressure (p_{EDS}) shared with said first clutch valve or as proportional pressure-reducing valve with separate pressure-adjuster control pressure.

8. Device according to any one of the preceding claims, characterized in that said first clutch valve (8) is designed with a valve piston (13) having several sections (13A, 13B, 13C) which define a first valve space (8A) pressurizable with pressure-adjuster control pressure (p_{EDS}); a second valve space (8B) equipped with a spring device (14) that counteracts the pressure-adjuster control pressure (p_{EDS}); and a third valve space (8C) which is connected with said piston space (4) of a pressure line (17) conveying fill pressure (p_v) and during pressurization of said first valve space (8A) is increasingly connected with a pressure line (15) conveying system pressure (p_{sys}).

9. Device according to claim 8, characterized in that between a connection of the line (17) conveying fill pressure (p_v) and said first valve space (8A) a discharge line (19) is located which is at least partly closed during pressurization of said first valve space (8A) with pressure-adjuster control pressure (p_{EDS}).

10. Device according to any one of the preceding claims, characterized in that said second clutch valve (9) is designed with a valve piston (23) having several piston sections (23A, 23B, 23C) which define a first valve space (9A) pressurizable with pressure-adjuster control pressure (p_{EDS}); a second valve space (9B) equipped with a spring device (24) that counteracts said

pressure-adjuster control pressure (p_{EDS}); and a third valve space (9C) connected with said holding valve (11) associated with said reset space (5) and a connectable thereby with said reset space (5) and, according to valve position, with a pressure line (6) leading to said piston space (4) and during pressurization of said first valve space (9A) is increasingly connected with a pressure line (17) conveying fill pressure (p_v).

11. Device according to claim 10, characterized in that between a connection to the line (6) leading to said piston space (4) and said first valve space (9A) a line (26) branches off which discharges in said line (25) leading to said holding valve (11) and, depending on the position thereof, to said reset space (5).

12. Device according to anyone of the preceding claims, characterized in that said holding valve (11) associated with said reset space (5) is designed with one valve piston (27) having several sections (27A, 27B) which define a first valve space (11A) pressurizable with a control pressure (p_{EDS}); a second valve space (11B) equipped with a spring device (28) that counteracts the control pressure (p_{EDS} ; p_1); and a third valve space (11C) connected with said reset space (5) and, according to valve position, with a pressure line (18) conveying system pressure (p_{sys}) and, when said first valve space (11A) is pressurized, is increasingly connected with a pressure line (25) leading to said second clutch valve (9).

13. Device according to any one of the preceding claims, characterized in that a holding valve (10) is associated with said piston space (4).

14. Device according to claim 1, characterized in that said holding valve (10) associated with said piston space (4) is designed with a valve piston (20) having several sections (20A, 20B) which define a first valve space (10A) pressurizable with pressure-adjuster control pressure (p_{EDS}); a second valve space (10B) equipped with a spring device (21) that counteracts said pressure-adjuster control pressure (p_{EDS}); and a third valve space (10C) connected with a pressure line (16) leading to said first clutch valve (8) and, depending on valve position, with a pressure line (6) leading to said clutch

space (4) or is increasingly connected with a discharge line (22) when said first valve space (10A) is pressurized.